

# 10/604,748 NPL STIC Search 8/3/2005

## Databases; Search History; & Results

Set	Items	Description
S1	1917762	MRI OR MAGNETIC(1W) (IMAG? OR IMAGING) OR MAGNETIC(W) RESONANCE? OR NMR OR NUCLEAR() MAGNETIC() RESONANCE OR FTNMR OR FTMRI OR MAGNETORESONANCE OR PMR OR PROTON(W) MAGNETIC(W) RESONANCE? OR MR() (IMAGE? OR IMAGING)
S2	7378	MC=(S01-E02A2 OR S03-E07A OR S01-E02A8A OR S01-E02A1 OR S03-E07C OR S05-D02B1 OR S03-C02F1)
S3	48946	IC=(G01R-003 OR G01N-024/08 OR G01V-003/A75 OR G01R-033/56F OR G01V-003/00)
S4	21865	CC=(A0758 OR A8760I OR B7510N)
S5	1954405	S1:S4
S6	2869	GRADIENT() (COIL? OR WIRE?)
S7	2096434	COOL????
S8	8000675	FLUID? OR LIQUID?
S9	4269331	DIRECT OR IMMEDIATE? OR INSTANT? OR NON() INTERVIEW OR NON-INTERVIEW?
S10	41	S6(6N)S7
S11	36	S5 AND S10
S12	32	RD (unique items)
S13	7	S12 AND S8
S14	10684813	DIRECT? OR IMMEDIATE? OR INSTANT? OR NON() INTERVIEW OR NON-INTERVIEW?
S15	3	S6 AND S7 AND S9
S16	3	S15 NOT S13
S17	272193	S14 AND S7
S18	69195	S14(10N)S7
S19	12	S14(6N)S7 AND S6
S20	9	RD (unique items)
S21	6	S20 NOT (S16 OR S13)

? show files

File 2:INSPEC 1969-2005/Jul W4  
(c) 2005 Institution of Electrical Engineers

File 155:MEDLINE(R) 1951-2005/Jul W5  
(c) format only 2005 Dialog

File 5:Biosis Previews(R) 1969-2005/Jul W4  
(c) 2005 BIOSIS

File 6:NTIS 1964-2005/Jul W4  
(c) 2005 NTIS, Intl Cpyrght All Rights Res

File 8:Ei Compendex(R) 1970-2005/Jul W4  
(c) 2005 Elsevier Eng. Info. Inc.

File 73:EMBASE 1974-2005/Aug 03  
(c) 2005 Elsevier Science B.V.

File 94:JICST-EPlus 1985-2005/Jun W2  
(c) 2005 Japan Science and Tech Corp(JST)

File 35:Dissertation Abs Online 1861-2005/Jul  
(c) 2005 ProQuest Info&Learning

File 144:Pascal 1973-2005/Jul W4  
(c) 2005 INIST/CNRS

File 105:AESIS 1851-2001/Jul  
(c) 2001 Australian Mineral Foundation Inc

File 99:Wilson Appl. Sci & Tech Abs 1983-2005/Jul  
(c) 2005 The HW Wilson Co.

File 58:GeoArchive 1974-2005/May  
(c) 2005 Geosystems

File 34:SciSearch(R) Cited Ref Sci 1990-2005/Jul W4  
(c) 2005 Inst for Sci Info

File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec  
(c) 1998 Inst for Sci Info

File 292:GEOBASE(TM) 1980-2005/Jun B1  
(c) 2005 Elsevier Science Ltd.

File 89:GeoRef 1785-2005/Jul B1  
(c) 2005 American Geological Institute  
File 65:Inside Conferences 1993-2005/Jul W5  
(c) 2005 BLDSC all rts. reserv.  
File 360:Specialty Chemicals Update Program 2000/Q2  
(c) 2000 SRI International  
File 239:Mathsci 1940-2005/Sep  
(c) 2005 American Mathematical Society  
File 347:JAPIO Nov 1976-2005/Apr(Updated 050801)  
(c) 2005 JPO & JAPIO  
File 305:Analytical Abstracts 1980-2005/Jul W4  
(c) 2005 Royal Soc Chemistry  
File 350:Derwent WPIX 1963-2005/UD,UM &UP=200549  
(c) 2005 Thomson Derwent  
File 162:Global Health 1983-2005/Jul  
(c) 2005 CAB International  
File 164:Allied & Complementary Medicine 1984-2005/Aug  
(c) 2005 BLHCIS  
File 357:Derwent Biotech Res. \_1982-2005/Aug W1  
(c) 2005 Thomson Derwent & ISI  
File 315:ChemEng & Biotec Abs 1970-2005/Jul  
(c) 2005 DECHEMA  
File 23:CSA Technology Research Database 1963-2005/Jul  
(c) 2005 CSA.

?

10/604,748

August 3<sup>rd</sup> 2005

16/3,K/1 (Item 1 from file: 347)  
DIALOG(R)File 347:JAPIO  
(c) 2005 JPO & JAPIO. All rts. reserv.

07119110 \*\*Image available\*\*

**DIRECT COOLING TYPE GRADIENT COIL**

PUB. NO.: 2001-346778 [JP 2001346778 A]  
PUBLISHED: December 18, 2001 (20011218)  
INVENTOR(s): KAINDL ARTHUR  
SCHOEN LOTHAR  
SCHUSTER JOHANN  
APPLICANT(s): SIEMENS AG  
APPL. NO.: 2001-112215 [JP 2001112215]  
FILED: April 11, 2001 (20010411)  
PRIORITY: 00 10018165 [DE 10018165], DE (Germany), April 12, 2000  
(20000412)

**DIRECT COOLING TYPE GRADIENT COIL**

ABSTRACT

PROBLEM TO BE SOLVED: To improve a **gradient coil** for an MR facility directly **cooled** by a **cooling** pipe embedded in the coil and having a **coolant** circulated by avoiding a large **cooling** pipe length, effectively actuating in a simple structure, and thus achieving a high output design of the **gradient coil**.

SOLUTION: **Cooling** pipes 2, 2', and 2" extended in parallel to each other, and favorably, in parallel to an axial line of this **gradient coil** are combined in the form of a heat exchanger module 1, and **cooling** pipes 2, 2', and 2" in the module 1 are connected to each other in such a way that the maximum length of distance between a **coolant** inlet 3 and a **coolant** exit 4 of the module 1 is twice the coil height.

COPYRIGHT: (C)2001,JPO

16/3,K/2 (Item 1 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

014127860 \*\*Image available\*\*

WPI Acc No: 2001-612070/200171

XRPX Acc No: N01-456862

**Gradient coil with direct cooling for magnetic resonance equipment - with heat exchanger modules arranged parallel to axis of gradient coil and parallel to each other**

Patent Assignee: SIEMENS AG (SIEI ); KAINDL A (KAIN-I); SCHOEN L (SCHO-I); SCHUSTER J (SCHU-I)

Inventor: KAINDL A; SCHOEN L; SCHUSTER J

Number of Countries: 004 Number of Patents: 007

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 10018165	A1	20011025	DE 10018165	A	20000412	200171 B
US 20010042385	A1	20011122	US 2001833909	A	20010412	200176
JP 2001346778	A	20011218	JP 2001112215	A	20010411	200206
GB 2364572	A	20020130	GB 20019006	A	20010410	200216
US 6552545	B2	20030422	US 2001833909	A	20010412	200330
DE 10018165	C2	20030807	DE 10018165	A	20000412	200352

Applied as  
cont in the  
H. 8/4/05

Deposited  
entries of  
S. 9  
Reference

101604748

August 31 2005

GB 2364572 B 20041215 GB 20019006 A 20010410 200482

Priority Applications (No Type Date): DE 10018165 A 20000412

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 10018165	A1		4	G01R-033/385	
US 20010042385	A1			F25D-017/02	
JP 2001346778	A		4	A61B-005/055	
GB 2364572	A			G01R-033/385	
US 6552545	B2			G01V-003/00	
DE 10018165	C2			G01R-033/385	
GB 2364572	B			G01R-033/385	

Gradient coil with direct cooling for magnetic resonance equipment...

...with heat exchanger modules arranged parallel to axis of gradient coil and parallel to each other

...Abstract (Basic): Cooling pipelines (2) are arranged parallel to each other and parallel to axis of gradient coil .

...Pipeline is arranged as heat exchanger modules (1) with single cooling pipes coupled with each other so that the maximum length between the inlet (3) and...

...USE - Avoids long cooling pipelines...

...ADVANTAGE - Length of cooling pipes is at most twice of coil height so little pressure loss, which allows low

...Title Terms: DIRECT ;

16/3,K/3 (Item 2 from file: 350)  
DIALOG(R) File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

N/A TAF 8/3/2005

004679644

WPI Acc No: 1986-182986/198628

XRPX Acc No: N86-136560

Solenoid magnet with Bitter coils of unequal length - has spacings chosen for max. homogeneity of axial magnetic field

Patent Assignee: AUBERT G (AUBE-I); THOMSON-CGR (CSFC )

Inventor: AUBERT G

Number of Countries: 012 Number of Patents: 004

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 8603882	A	19860703	WO 85FR341	A	19851129	198628 B
FR 2574980	A	19860620				198631
EP 204742	A	19861217	EP 85905843	A	19851129	198651
US 4748429	A	19880531	US 86905316	A	19860813	198824

Priority Applications (No Type Date): FR 8419191 A 19841214

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
WO 8603882	A	F	18		

Designated States (National): JP US

Designated States (Regional): AT BE CH DE FR GB IT LU NL SE

EP 204742 A F

Designated States (Regional): DE GB NL

...Abstract (Basic): Three pairs of coils (13-15) are sepd. by tubular spacers (20) contg. **coolant** liq. (25), and are connected electrically in series to a **direct** -current supply (29). The coils have common internal and external dia. but their lengths are...

...axis of the central bore (11). The assembly is surrounded by a conventional system of **gradient coils** (30), and an internal array of RF antennas (31) is excited from a generator (33...

...USE/ADVANTAGE - For NMR imaging. Reduced conductor mass and electrical power consumption. **Coolant** circulation simplified. (18pp Dwg.No.3/3)

?

10/604, 748

August 31 2005

X

13/3,K/16 (Item 10 from file: 350) Links

Derwent WPIX

(c) 2005 Thomson Derwent. All rights reserved.

Applied As per Ad in the  
8/6/2005 Office Action  
Ex. TIAF

011036465 \*\*Image available\*\*

WPI Acc No: 1997-014389/199702

XRPX Acc No: N97-012494

**Superconductive magnet for magnetic  
resonance imaging system - has one or more  
gradient coils of superconductive material  
operative to produce field gradients during operation of the magnet**

Patent Assignee: CRYOGENIC LTD (CRYO-N); HEWLETT-PACKARD CO (HEWP )

Inventor: GOOD J A; LARSON J D

Number of Countries: 002 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
GB 2301674	A	19961211	GB 9511086	A	19950601	199702 B
US 5661445	A	19970826	US 9665552	A	19960530	199740

Priority Applications (No Type Date): GB 9511086 A 19950601

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
GB 2301674	A	14		G01R-033/385	
US 5661445	A	5		H01F-001/00	

**Superconductive magnet for magnetic  
resonance imaging system...**

**...has one or more gradient coils of  
superconductive material operative to produce field gradients during  
operation of the magnet**

**...Abstract (Basic): The assembly comprises gradient  
coils (24 or 24') enclosed in the vacuum vessel (18) and a  
radiation shield surrounding the main field coils (22). The  
gradient coils and the main field coils share  
a common former (20). The gradient coils may  
comprise filaments or filament bundles, and the filaments may be  
produced from conventional metal...**

**...sapphire, alumina, ceramics or diamond. The filaments are provided in a  
tubular conduit carrying a cooling fluid. The  
magnet is cooled by helium or by a cryo-  
cooler.**

**...Abstract (Equivalent): primary coil of superconductive material, a  
magnet former supporting the primary coil, one or more  
gradient coils of superconductive material**

operative to produce field gradients during operation of the magnet,  
the one or more **gradient coils** being  
supported by the magnet former, and a heat insulating housing within  
which the primary coil and the one or more **gradient  
coils** are housed...

...Title Terms: **MRI**



10/604,748

August 3<sup>rd</sup> 2005

13/3,K/1 (Item 1 from file: 35)  
DIALOG(R)File 35:Dissertation Abs Online  
(c) 2005 ProQuest Info&Learning. All rts. reserv.

01656932 ORDER NO: AADNQ-28481  
**HIGH RESOLUTION MR SYSTEM FOR DYNAMIC ARTERIAL IMAGING IN VITRO ( MAGNETIC  
RESONANCE IMAGING , VASCULAR ELASTICITY)**  
Author: CHU, KENNETH C.  
Degree: PH.D.  
Year: 1997  
Corporate Source/Institution: THE UNIVERSITY OF WESTERN ONTARIO (CANADA)  
(0784)  
Source: VOLUME 59/07-B OF DISSERTATION ABSTRACTS INTERNATIONAL.  
PAGE 3293. 192 PAGES  
ISBN: 0-612-28481-6

**HIGH RESOLUTION MR SYSTEM FOR DYNAMIC ARTERIAL IMAGING IN VITRO ( MAGNETIC  
RESONANCE IMAGING , VASCULAR ELASTICITY)**

The goal of this research is to develop a **magnetic resonance ( MR )  
imaging** system for dynamic imaging of arteries and phantoms in vitro.  
The system is used to...

...values. Important parameters in minimizing coil temperature were small  
radius, large copper mass, and forced **cooling** . The **gradient coil** set  
permitted collection of 33 cardiac gated images in 64 seconds with no  
temperature change...

...x 2.5 mm thick) was increased by averaging 8 sets of data.

A hydrogenless **fluid** (1,1,2-trichloro-1,2,2-trifluoroethane) was  
found to be ideal as a pumping **fluid** since it does not introduce flow  
artifacts in **MR imaging** . The **fluid** was demonstrated to be compatible  
with arterial tissue for periods under 7 hours as assessed...

13/3,K/2 (Item 1 from file: 144)  
DIALOG(R)File 144:Pascal  
(c) 2005 INIST/CNRS. All rts. reserv.

10836323 PASCAL No.: 93-0345682  
**Module a bobinages de gradients plats tridimensionnels et a antenne  
refroidie pour l'IRM a haute resolution spatiale**  
(Specific module with flat tridimensional gradient coils and cooled  
**radiofrequency coil for high spatial resolution MRI** )  
COEUR-JOLY Odile; SAINT-JALMES Herve, dir  
Universite de Paris 11, Francee  
Univ.: Universite de Paris 11. FRA Degree: Th. doct. : Electron.  
1992-12; 1992 252 p.  
Language: French Summary Language: French; English

(Specific module with flat tridimensional gradient coils and cooled  
**radiofrequency coil for high spatial resolution MRI** )  
... reception radiofrequence, egalement integrees dans le module, sont  
refroidies a la temperature de l'azote **liquide** pour diminuer leur bruit.  
Deux types d'antennes sont decrites: des antennes en cuivre et...

13/3,K/3 (Item 1 from file: 350)  
DIALOG(R)File 350:Derwent WPIX

N/A  
TAF 8/3/2005

N/A JAF 8/3/2005



10/604,748

August 3<sup>rd</sup> 2005

(c) 2005 Thomson Derwent. All rts. reserv.

016870217 \*\*Image available\*\*

WPI Acc No: 2005-194522/200520

XRPX Acc No: N05-160750

**Transverse gradient coil for open architecture magnetic resonance imaging system, has strip of electrically conductive material with hollow portion such that fluid is permitted to flow through conductive material**

Patent Assignee: GE MEDICAL SYSTEMS GLOBAL TECHNOLOGY CO (GENE ); CLARKE N (CLAR-I); DUBY T (DUBY-I); LIU Q (LIUQ-I); MANTONE A (MANT-I); SELLERS M B (SELL-I)

Inventor: CLARKE N; DUBY T; LIU Q; MANTONE A; SELLERS M B

Number of Countries: 003 Number of Patents: 003

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20050035764	A1	20050217	US 2003604748	A	20030814	200520 B
JP 2005058770	A	20050310	JP 2004235800	A	20040813	200520
GB 2406173	A	20050323	GB 200418128	A	20040813	200521

Priority Applications (No Type Date): US 2003604748 A 20030814

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20050035764	A1		9	G01V-003/00	
JP 2005058770	A		9	A61B-005/055	
GB 2406173	A			G01R-033/385	

*Applicants own instnt  
Applicant NA Pw NA  
Ex. TAF 8/3/2005*

**Transverse gradient coil for open architecture magnetic resonance imaging system, has strip of electrically conductive material with hollow portion such that fluid is permitted to flow through conductive material**

Abstract (Basic):

... coil (200) has a strip of electrically conductive material having a hollow portion such that **fluid** is permitted to flow through the conductive material.

... 1) **magnetic resonance imaging** apparatus...

...3) method for **cooling gradient coil** assembly...

...For use in architecture **magnetic resonance imaging (MRI)** system

...The thermal efficiency of the **magnetic resonance imaging (MRI)** is increased and the imaging quality is improved by reducing homogeneity variations due to temperature...

...Title Terms: **FLUID** ;

...International Patent Class (Main): **G01R-033/385** ...

... **G01V-003/00**

International Patent Class (Additional): **G01R-033/389**

...Manual Codes (EPI/S-X): **S01-E02A8A** ...

... **S03-E07A**

**13/3,K/4 (Item 2 from file: 350)**

DIALOG(R) File 350:Derwent WPIX

(c) 2005 Thomson Derwent. All rts. reserv.

10/604,748 August 3<sup>rd</sup> 2005

016396969 \*\*Image available\*\*  
WPI Acc No: 2004-554878/200454  
XRPX Acc No: N04-438930

Hose connection for liquid flow distributor to feed liquid to cooling circuits of especially gradient coils of MRI -scanner has hose fitted into sleeve and by outer surface sealed against inner surface of sleeve

Patent Assignee: SIEMENS AG (SIEI )  
Inventor: SCHUSTER J; STOCKER S  
Number of Countries: 001 Number of Patents: 001  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 10332085	A1	20040805	DE 10332085	A	20030715	200454 B

Priority Applications (No Type Date): DE 10332085 A 20030715

Patent Details:  
Patent No Kind Lan Pg Main IPC Filing Notes  
DE 10332085 A1 5 F16L-033/22

Hose connection for liquid flow distributor to feed liquid to cooling circuits of especially gradient coils of MRI -scanner has hose fitted into sleeve and by outer surface sealed against inner surface of...

Abstract (Basic):

... The hose connection for a liquid flow distributor (1) to feed or distribute a liquid to cooling circuits of especially gradient coils has a hose (4) fitted into sleeve (3') and by its outer surface (8) sealed...

... The hose connection is for a liquid flow distributor to feed or distribute a liquid to cooling circuits of especially gradient coils of MRI -scanners...

...The drawing shows a longitudinal section through a fluid flow distributor with cooling hoses fitted in sleeves and sealed by an O-ring...

... liquid flow distributor (1  
...Title Terms: LIQUID ;

13/3,K/5 (Item 3 from file: 350)  
DIALOG(R)File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

015804528 \*\*Image available\*\*  
WPI Acc No: 2003-866732/200381  
XRPX Acc No: N03-691776

Distributor for feeding coolant to MRI gradient coils is made up of two sections with central fluid channels and branch connections, sections being connected by bolt with blind bore and apertures in its walls

Patent Assignee: SIEMENS AG (SIEI )  
Inventor: STOCKER S  
Number of Countries: 001 Number of Patents: 002  
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 10214918	A1	20031113	DE 1014918	A	20020404	200381 B
DE 10214918	B4	20040226	DE 1014918	A	20020404	200415

*Publications Do Not Have a Valid Prior Art date*  
*The Date of these References are no good Ex. TAF 8/3/2005*

*Only Publication date is Applicable and the Publication date is No good*

*Not Prior Art Ex. TAF 8/3/2005*

10/604,748

August 3rd 2005

Priority Applications (No Type Date): DE 1014918 A 20020404

## Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 10214918	A1		6	F16K-011/10	
DE 10214918	B4			F16K-011/10	

**Distributor for feeding coolant to MRI gradient coils is made up of two sections with central fluid channels and branch connections, sections being connected by bolt with blind bore and apertures in...**

## Abstract (Basic):

... The three-dimensional distributor for feeding coolant to MRI gradient coils is made up of two sections (2a, 2b) with central fluid channels (6) and branch connections (8) to cooling circuits. The two sections are connected by...

... Feeding coolant to MRI gradient coils .

... Fluid channels (6

...Title Terms: MRI ;

**13/3,K/6 (Item 4 from file: 350)**  
 DIALOG(R)File 350:Derwent WPIX  
 (c) 2005 Thomson Derwent. All rts. reserv.

013035279 \*\*Image available\*\*

WPI Acc No: 2000-207130/200019

XRFX Acc No: N00-154211

**Directly cooled magnetic coil especially gradient coil for magnetic resonance equipment - as moulded segments of inter-twisted individual flexible leads of stranded conductor placed around cooling tube**

Patent Assignee: SIEMENS AG (SIEI )

Inventor: ARZ W; STOCKER S

Number of Countries: 003 Number of Patents: 005

## Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 1920839987	A1	20000309	DE 198039987	A	19980902	200019
GB 2342986	A	20000426	GB 9920411	A	19990827	200023
DE 1920839987	C2	20000706	DE 198039987	A	19980902	200035
GB 2342986	B	20020130	GB 9920411	A	19990827	200216
US 6741152	B1	20040525	US 99388582	A	19990902	200435

Priority Applications (No Type Date): DE 198039987 A 19980902

## Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 1920839987	A1		8	G01R-033/385	
GB 2342986	A			G01R-027/16	
DE 1920839987	C2			G01R-033/385	
GB 2342986	B			G01R-027/16	
US 6741152	B1			H01F-005/00	

**Directly cooled magnetic coil especially gradient coil for magnetic resonance equipment...**

...Abstract (Basic): for the windings, which are provided with an inner cooling channel to convey a cooling liquid e.g. water. The conductors are designed as moulded segmented conductors (1,1'), whose discrete...

...International Patent Class (Main): G01R-033/385

International Patent Class (Additional): G01R-033/38 ...

*AA Already made  
 Record by The Examiner  
 from US Pat Updated Search  
 Ex. TAF 8/3/2005*

*Has a plastic coating  
 Between windings*

*N/A TAF 8/3/2005*

10/604,748

August 31 2005

... G01R-033/385

Manual Codes (EPI/S-X): S01-E02A2 ...

... S01-E02A8A ...

... S03-E07A ...

... S05-D02B1

13/3,K/7 (Item 5 from file: 350)

DIALOG(R)File 350:Derwent WPIX

(c) 2005 Thomson Derwent. All rts. reserv.

004098792

WPI Acc No: 1984-244333/198440

XRPX Acc No: N84-182736

Generation of pictures and spectra of object using NMR - using cryostat  
with vacuum jacket in which gradient coils are spatially insulated

Patent Assignee: SIEMENS AG (SIEI )

Inventor: OPPELT A

Number of Countries: 005 Number of Patents: 005

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 3310160	A	19840927	DE 3310160	A	19830321	198440 B
EP 123075	A	19841031	EP 84102395	A	19840306	198444
EP 123075	B	19870204				198705
DE 3462359	G	19870312				198711
US 4652824	A	19870324	US 84586049	A	19840305	198714

Priority Applications (No Type Date): DE 3310160 A 19830321

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

DE 3310160 A 17

EP 123075 A G

Designated States (Regional): DE FR GB NL

EP 123075 B G

Designated States (Regional): DE FR GB NL

Generation of pictures and spectra of object using NMR -

...Abstract (Basic): for producing images and spatially resolved spectra of an object under examination by means of **nuclear magnetic resonance**, wherein there are arranged magnetic coils for applying fundamental and gradient fields to the object...

...arranged in the vacuum jacket with the gradient coils which are spatially insulated. Pref. the **gradient coils** are **cooled** by the vaporising helium which serves to cool the super-conducting base field coils. Alternatively, the **gradient coils** may be **cooled** by vaporising **liquid** nitrogen which cools radiation shields in the cryostat...

...Abstract (Equivalent): for producing images and spatially resolved spectra of an object under examination by means of **nuclear magnetic resonance**, wherein there are arranged magnetic coils for applying fundamental and gradient fields to the object...

...Title Terms: NMR ;

...International Patent Class (Additional): G01N-024/08 ...

G01R-033/20

N/A

Ex. TAF  
8/3/2005

10/604,748

Aug 31 2005

21/3,K/1 (Item 1 from file: 2)  
DIALOG(R)File 2:INSPEC  
(c) 2005 Institution of Electrical Engineers. All rts. reserv.

8269207 INSPEC Abstract Number: A2005-06-8760I-064, B2005-03-7510N-118  
Title: Momentum-weighted conjugate gradient descent algorithm for  
gradient coil optimization  
Author(s): Hanbing Lu; Jesmanowicz, A.; Shi-Jiang Li; Hyde, J.S.  
Author Affiliation: Dept. of Biophys., Med. Coll. of Wisconsin,  
Milwaukee, WI, USA  
Journal: Magnetic Resonance in Medicine vol.51, no.1 p.158-64  
Publisher: Wiley,  
Publication Date: Jan. 2004 Country of Publication: USA  
CODEN: MRMEEN ISSN: 0740-3194  
SICI: 0740-3194(200401)51:1L:158:MWCG;1-3  
Material Identity Number: K620-2004-001  
U.S. Copyright Clearance Center Code: 0740-3194/04/\$3.00  
Language: English  
Subfile: A B  
Copyright 2005, IEE

Date No good  
Not Pat Art  
Ex. TAF 8/3/2005

Title: Momentum-weighted conjugate gradient descent algorithm for  
gradient coil optimization  
Abstract: MRI gradient coil design is a type of nonlinear constrained  
optimization. A practical problem in transverse gradient coil design  
using the conjugate gradient descent (CGD) method is that wire elements  
move at different...

...intrinsic property of the Levenberg-Marquardt algorithm, to adjust step  
sizes along the three orthogonal directions. A water-cooled, 12.8 cm  
inner diameter, three axis torque-balanced gradient coil for rat  
imaging was developed based on this method, with an efficiency of 2.13...

...field uniformity by 27%. This method has also been applied to the design  
of a gradient coil for the human brain, employing remote current return  
paths. The benefits of this design include improved gradient field  
uniformity and efficiency, with a shorter length than gradient coil  
designs using coaxial return paths.

...Identifiers: gradient coil optimization...

...MRI gradient coil design...

...three axis torque-balanced gradient coil ;

21/3,K/2 (Item 1 from file: 155)  
DIALOG(R)File 155:MEDLINE(R)  
(c) format only 2005 Dialog. All rts. reserv.

15138767 PMID: 14705056  
Momentum-weighted conjugate gradient descent algorithm for gradient  
coil optimization.  
Lu Hanbing; Jesmanowicz Andrzej; Li Shi-Jiang; Hyde James S  
Department of Biophysics, Medical College of Wisconsin, Milwaukee,  
Wisconsin 53226, USA.  
Magnetic resonance in medicine - official journal of the Society of  
Magnetic Resonance in Medicine / Society of Magnetic Resonance in Medicine  
(United States) Jan 2004, 51 (1) p158-64, ISSN 0740-3194  
Journal Code: 8505245

Date No good Not Pat Art Ex. TAF 8/3/2005



10/604,748

August 31 2005

Contract/Grant No.: EB000215; EB; NIBIB; EB002014; EB; NIBIB  
Publishing Model Print  
Document type: Journal Article  
Languages: ENGLISH  
Main Citation Owner: NLM  
Record type: MEDLINE; Completed

N/A TRAF 8-3-2005

Date is 10/604

**Momentum-weighted conjugate gradient descent algorithm for gradient coil optimization.**

MRI **gradient coil** design is a type of nonlinear constrained optimization. A practical problem in transverse **gradient coil** design using the conjugate gradient descent (CGD) method is that wire elements move at different...

...intrinsic property of the Levenberg-Marquardt algorithm, to adjust step sizes along the three orthogonal **directions**. A water- **cooled**, 12.8 cm inner diameter, three axis torque-balanced **gradient coil** for rat imaging was developed based on this method, with an efficiency of 2.13...

...field uniformity by 27%. This method has also been applied to the design of a **gradient coil** for the human brain, employing remote current return paths. The benefits of this design include improved gradient field uniformity and efficiency, with a shorter length than **gradient coil** designs using coaxial return paths. Copyright 2003 Wiley-Liss, Inc.

21/3,K/3 (Item 1 from file: 94)

DIALOG(R)File 94:JICST-EPlus

(c)2005 Japan Science and Tech Corp(JST). All rts. reserv.

04163700 JICST ACCESSION NUMBER: 99A0415255 FILE SEGMENT: JICST-E

**Development and Future Aspects of Middle Field MRI System.**

GORO TAKEHIKO (1); SUGIMOTO HIROSHI (1); MACHIDA YOSHIO (1)

(1) Toshiba Corp.

Nichidoku Iho(Japanisch-Deutsche Medizinische Berichte), 1998,

VOL.43,zokango, PAGE.164-172, FIG.9, REF.15

JOURNAL NUMBER: S0730BAH ISSN NO: 0912-0351

UNIVERSAL DECIMAL CLASSIFICATION: 616-071

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

ARTICLE TYPE: Commentary

MEDIA TYPE: Printed Publication

...ABSTRACT: developed and introduced a new middle field system, MRT-50A/SUPER, with an actively shielded **gradient coil** and MR angiography capability in 1992. Then, another new 0.5-T system, FLEXART, was...

...type superconducting magnet with superior access to the patient area and a new refrigerator which **cools** the superconducting wire **directly** without liquid helium. (author abst.)

21/3,K/4 (Item 1 from file: 347)

DIALOG(R)File 347:JAPIO

(c) 2005 JPO & JAPIO. All rts. reserv.

08310510 \*\*Image available\*\*

METHOD AND APPARATUS FOR **DIRECTLY COOLING** HOLLOW CONDUCTOR WOUND AROUND TRANSVERSE **GRADIENT COIL** BOARDS

8-3-2005

N/A TRAF

direct Cooling  
Main Magnetic Coils  
Not Gradient Coils

10/604748

August 31 2005

PUB. NO.: 2005-058770 [JP 2005058770 A]  
PUBLISHED: March 10, 2005 (20050310)  
INVENTOR(s): MANTONE ANTHONY  
CLARKE NEIL  
DUBY TOMAS  
LIU QIN  
SELLERS MICHAEL B  
APPLICANT(s): GE MEDICAL SYSTEMS GLOBAL TECHNOLOGY CO LLC  
APPL. NO.: 2004-235800 [JP 2004235800]  
FILED: August 13, 2004 (20040813)  
PRIORITY: 03 604748 [US 2003604748], US (United States of America),  
August 14, 2003 (20030814)

Applicant's Own Invention  
Application Not Prior Art

Ex. TAF 8-3-2005

METHOD AND APPARATUS FOR **DIRECTLY COOLING** HOLLOW CONDUCTOR WOUND AROUND  
TRANSVERSE **GRADIENT COIL** BOARDS

#### ABSTRACT

PROBLEM TO BE SOLVED: To provide an assembly which dissipates heat generated by a transverse **gradient coil** board used for MRI.

SOLUTION: MRI operates by passing current through **gradient coils** (212, 214) to create a magnetic field. Creation of the magnetic field requires a relatively...

...the patient space. The present invention provides for a hollow conductor (212) through which a **coolant** can be passed **directly** during the application of current.

COPYRIGHT: (C)2005, JPO&NCIPI

21/3,K/5 (Item 1 from file: 350)

DIALOG(R) File 350:Derwent WPIX  
(c) 2005 Thomson Derwent. All rts. reserv.

017071198 \*\*Image available\*\*  
WPI Acc No: 2005-395539/200540  
XRPX Acc No: N05-320612

Gradient coil system for magnetic resonance imaging system, has **primary coil element made from hollow conductor, that is arranged between X and Y primary coil elements that have mutually different linearity volumes respectively**

Patent Assignee: KONINK PHILIPS ELECTRONICS NV (PHIG )

Inventor: HAM C L G

Number of Countries: 108 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200543185	A1	20050512	WO 2004IB52121	A	20041018	200540 B

Priority Applications (No Type Date): EP 2003103998 A 20031029

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

WO 200543185 A1 E 20 G01R-033/385

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ  
CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID  
IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ  
NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ  
UA UG US UZ VC VN YU ZA ZM ZW

Designated States (Regional): AT BE BG BW CH CY CZ DE DK EA EE ES FI FR

Date No good  
Not Available as Prior Art  
Ex. TAF 8/3/2005



10/604,948

August 31 2005

GB GH GM GR HU IE IT KE LS LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL  
SZ TR TZ UG ZM ZW

Gradient coil system for magnetic resonance imaging system, has Z  
primary coil element made from hollow conductor...

Abstract (Basic):

... The X and Y primary coil elements are cooled directly by the  
cooling fluid flowing through the Z primary coil element...

...The figure shows a cross-sectional view of the gradient coil system  
...

21/3,K/6 (Item 2 from file: 350)

DIALOG(R)File 350:Derwent WPIX

(c) 2005 Thomson Derwent. All rts. reserv.

008859073 \*\*Image available\*\*

WPI Acc No: 1991-363096/199150

XRPX Acc No: N91-278137

Superconducting magnet apparatus with circulating path for coolant - has  
coil with shaped annulus surrounding photographic field contained in  
coolant vessel of double structure filled with liquid helium

Patent Assignee: TOSHIBA KK (TOKE )

Inventor: SATO A

Number of Countries: 005 Number of Patents: 006

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
EP 460601	A	19911211	EP 91109106	A	19910604	199150 B
JP 4042977	A	19920213	JP 90147473	A	19900607	199213
EP 460601	A3	19920617	EP 91109106	A	19910604	199333
US 5304972	A	19940419	US 91711203	A	19910606	199415
EP 460601	B1	19950726	EP 91109106	A	19910604	199534
DE 69111518	E	19950831	DE 611518	A	19910604	199540
			EP 91109106	A	19910604	

Priority Applications (No Type Date): JP 90147473 A 19900607

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

EP 460601 A

Designated States (Regional): DE FR GB

JP 4042977 A 4

US 5304972 A 7 H01L-039/00

EP 460601 B1 E 9 H01F-006/06

Designated States (Regional): DE FR GB

DE 69111518 E H01F-006/06 Based on patent EP 460601

...Abstract (Equivalent): which is substantially perpendicular to the line  
of gravity, i.e., extending in the horizontal direction. The coil is  
contained in a coolant vessel of a double structure filled with a  
coolant (e.g. liquid helium). Specifically, it...

...tip portion of superconducting coil is reduced to minimum necessary  
value without losing symmetry to gradient coil of cryostat of MRI,  
enhancing economy and safety during operation...

?

N/A TAF  
8/3/2005

main  
Superconducting Magnet is cooled  
Not Gradient Coil

10/604,748

August 3rd 2005

13/3,K/7 (Item 1 from file: 350) Links

Derwent WPIX

(c) 2005 Thomson Derwent. All rights reserved.

Not Prior Art  
Date No good  
Ex. TAF 8-3-2005

017071198 \*\*Image available\*\*

WPI Acc No: 2005-395539/200540

XRFX Acc No: N05-320612

**Gradient coil system for**

**magnetic resonance imaging system,**

**has Z primary coil element made from hollow conductor, that is arranged between X and Y primary coil elements that have mutually different linearity volumes respectively**

Patent Assignee: KONINK PHILIPS ELECTRONICS NV (PHIG )

Inventor: HAM C L G

Number of Countries: 108 Number of Patents: 001

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
WO 200543185	A1	<u>20050512</u>	WO 2004IB52121	A	<u>20041018</u>	200540 B

Priority Applications (No Type Date): EP 2003103998 A 20031029

Patent Details:

Patent No Kind Lan Pg Main IPC Filing Notes

WO 200543185 A1 E 20 G01R-033/385

Designated States (National): AE AG AL AM AT AU AZ BA BB BG BR BW BY BZ  
CA CH CN CO CR CU CZ DE DK DM DZ EC EE EG ES FI GB GD GE GH GM HR HU ID  
IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ  
NA NI NO NZ OM PG PH PL PT RO RU SC SD SE SG SK SL SY TJ TM TN TR TT TZ  
UA UG US UZ VC VN YU ZA ZM ZW

Designated States (Regional): AT BE BG BW CH CY CZ DE DK EA EE ES FI FR  
GB GH GM GR HU IE IT KE LS LU MC MW MZ NA NL OA PL PT RO SD SE SI SK SL  
SZ TR TZ UG ZM ZW

**Gradient coil system for**

**magnetic resonance imaging system,**

**has Z primary coil element made from hollow conductor, that is arranged between X...**

Abstract (Basic):

... An INDEPENDENT CLAIM is also included for **magnetic resonance imaging system...**

...For **magnetic resonance imaging** system (claimed...)

...The X and Y primary coil elements are **cooled** directly by the **cooling fluid** flowing through the Z primary coil element...

...The figure shows a cross-sectional view of the **gradient**

coil system...

10/604, 748

August 24 2005

13/3,K/8 (Item 2 from file: 350) Links

Derwent WPIX

(c) 2005 Thomson Derwent. All rights reserved.

Applicant's Own Work  
TAF d current Application  
8/3/2005  
Not Prior Art

016870217 \*\*Image available\*\*

WPI Acc No: 2005-194522/200520

XRFX Acc No: N05-160750

**Transverse gradient coil for open  
architecture magnetic resonance  
imaging system, has strip of electrically conductive  
material with hollow portion such that fluid is permitted to  
flow through conductive material**

Patent Assignee: GE MEDICAL SYSTEMS GLOBAL TECHNOLOGY CO (GENE ); CLARKE N  
(CLAR-I); DUBY T (DUBY-I); LIU Q (LIUQ-I); MANTONE A (MANT-I); SELLERS M  
B (SELL-I)

Inventor: CLARKE N; DUBY T; LIU Q; MANTONE A; SELLERS M B

Number of Countries: 003 Number of Patents: 003

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
US 20050035764	A1	20050217	US 2003604748	A	20030814	200520 B
JP 2005058770	A	20050310	JP 2004235800	A	20040813	200520
GB 2406173	A	20050323	GB 200418128	A	20040813	200521

Priority Applications (No Type Date): US 2003604748 A 20030814

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20050035764	A1		9	G01V-003/00	
JP 2005058770	A		9	A61B-005/055	
GB 2406173	A			G01R-033/385	

**Transverse gradient coil for open  
architecture magnetic resonance  
imaging system, has strip of electrically conductive  
material with hollow portion such that fluid is permitted to  
flow through conductive material**

Abstract (Basic):

... A transverse **gradient coil** (200) has a  
strip of electrically conductive material having a hollow portion such  
that **fluid** is permitted to flow through the conductive  
material.

... 1) **magnetic resonance  
imaging apparatus...**

...2) **gradient coil assembly; and...**

...3) method for **cooling gradient  
coil assembly...**

...For use in architecture **magnetic resonance**

imaging (MRI) system...

...The thermal efficiency of the **magnetic resonance imaging (MRI)** is increased and the imaging quality is improved by reducing homogeneity variations due to temperature...

...The figure shows a schematic illustration of the **cooling** system...

...**gradient coil** (200...

...**cooling** tubes (232...

...**coolant** pump (240...

...**coolant** lines (261,262

...Title Terms: **FLUID**;

10/604,748

August 3<sup>rd</sup> 200513/3,K/10 (Item 4 from file: 350) Links

Derwent WPIX

(c) 2005 Thomson Derwent. All rights reserved.

016634791 \*\*Image available\*\*

WPI Acc No: 2004-793504/200478

XRAM Acc No: C04-276999

XRPX Acc No: N04-625219

Not Prior Art

Date No good

Ex. TAF 8/3/2005

**Magnetic resonance**

imaging system used in medical procedure for obtaining detailed images of patient, comprises patient bore, gradient coil assembly, radio frequency coil assembly, copper stub, and non-conducting manifold

Patent Assignee: GENERAL ELECTRIC CO (GENE )

Inventor: SELLERS M B

Number of Countries: 003 Number of Patents: 003

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 6812705	B1	20041102	US 2003707322	A	20031205	200478	B
GB 2409279	A	20050622	GB 200426388	A	20041201	200541	
JP 2005199047	A	20050728	JP 2004350874	A	20041203	200549	

Priority Applications (No Type Date): US 2003707322 A 20031205

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 6812705	B1		8	G01V-003/00	
GB 2409279	A			A61B-005/055	
JP 2005199047	A		13	A61B-005/055	

**Magnetic resonance**

imaging system used in medical procedure for obtaining detailed images of patient, comprises patient bore, gradient coil assembly, radio frequency coil assembly, copper stub, and non-conducting manifold

Abstract (Basic):

... A magnetic resonance

imaging system has patient bore; gradient coil assembly surrounding patient bore; radio frequency coil assembly between patient bore and gradient coil assembly; copper stub fluidically coupled to each hollow conductor structure (43); and non-conducting manifold fluidically coupled to each copper stub pipe and coolant source.

... The magnetic resonance

imaging (MRI) system comprises patient bore; gradient coil assembly surrounding patient bore; radio frequency (RF) coil assembly between patient bore and gradient coil assembly, and comprising hollow

conductor structure **fluidically** coupled to **coolant** source having non-conductive **coolant** flowing through the conductor structure to maintain the patient bore below a maximum desired temperature during operation of the **MRI** system; copper stub **fluidically** coupled to each hollow conductor structure; and non-conducting manifold **fluidically** coupled to each copper stub pipe and **coolant** source. An INDEPENDENT CLAIM is also included for a method for forming **MRI** machine having temperature-controlled patient bore comprising providing pair of mandrels (71, 73); introducing RF...

...pressure to the cavity; curing the uncured composite material; removing the mandrels to form a **coolant-cooled** body coil assembly; introducing the **coolant-cooled** RF body coil assembly within the **MRI** machine between a **gradient coil** assembly and the patient bore; **fluidically** coupling the **coolant-cooled** RF body coil to the **coolant** source; and introducing a **coolant** from the **coolant** source through the body coil during scanning procedure...

...The invention allows RF body coils to run **cooler** and provide a thermal barrier to heat emitted by the **gradient coil** during **MRI** scan. This makes the patient bore **cooler** during the scans. This in turn allows the scans to be longer without affecting the...

...The figure is a partial section view of the **MRI** system...

#### Technology Focus:

... RF antennae (25) spaced circumferentially around the patient bore; composite material; hollow conductor structures; and **coolant** source. The **MRI** system further comprises glass cloth introduced within the composite material. Preferred Materials: The composite material is formed from reaction of bisphenol A-type epoxy resin with an anhydride hardener. The **coolant** source comprises water. The non-conductive **coolant** comprises deionized water. The hollow conductor structures comprise hollow copper structure.